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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.  | CONFIRMATION NO. |
|--|-------------|----------------------|----------------------|------------------|
| 09/943,150   | 08/30/2001  | Daniel P. DeLuca     | 01-415               | 8646             |
| 7590   | 04/27/2006  |                      | EXAMINER             |                  |
| Barry L. Kelmachter<br>BACHMAN & LaPOINTE, P.C.<br>Suite 1201<br>900 Chapel Street<br>New Haven, CT 06510-2802 |             |                      | WILKINS III, HARRY D |                  |
|  |             |                      | ART UNIT             | PAPER NUMBER     |
|  |             |                      | 1742                 |                  |
| DATE MAILED: 04/27/2006  |             |                      |                      |                  |

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 09/943,150             | DELUCA ET AL.       |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Harry D. Wilkins, III  | 1742                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 20 March 2006.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1,4-11 and 24-28 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1,4-11 and 24-28 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 30 August 2001 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | Paper No(s)/Mail Date. _____ .  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|   | 6) <input type="checkbox"/> Other: _____ .                                  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 19 December 2005 has been entered.

### ***Means-Plus-Function Language***

2. Instant claim 27 contains the following term written in means-plus-function format, and has been interpreted as follows:

"means for impeding preferential cracking in the  $\gamma$  matrix phase" is in proper means-plus-function format and is defined in the specification at page 5 as being the uniform distribution of large octet shaped  $\gamma'$  particles. This limitation is thus considered to read on the large octet shaped  $\gamma'$  particles and equivalents thereof.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 1 and 4-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erickson (US 5,366,695) in view of Kenton (US 4,302,256) and DeLuca et al (US 5,605,584).

Erickson teaches (see abstract and title) a single crystal nickel-based superalloy that contains 1.8-4.0 wt% Cr, 0.25-2.0 wt% Mo, 3.5-7.5 wt% W, *about* 5.0-7.0 wt% Re, 7.0-10.0 wt% Ta, 5.0-7.0 wt% Al, 1.5-9.0 wt% Co, 0-0.15 wt% Hf, 0-0.5 wt% Nb (columbium), 0.1-1.2 wt% Ti and the balance Ni. Erickson further teaches (see col 2, lines 44-56) that the alloy may contain 0-0.04 wt% C, 0-0.01 wt% B, 0-0.01 wt% Zr and 0-0.1 wt% V. This composition overlaps the presently claimed range at 3.0-4.0 wt% Cr, 0.25-2.0 wt% Mo, 3.5-7.5 wt% W, *about* 5.0 wt% Re, 7-10 wt% Ta, 5-7 wt% Al, 1.5-9.0 wt% Co, 0-0.04 wt% C, 0-0.01 wt% B, 0-0.01 wt% Zr, 0-0.15 wt% Hf, 0-0.5 wt% Nb, 0-0.1 wt% V and 0.1-0.7 wt% Ti. Regarding the presence of at least one of Ru, Rh, Pd, Os, Ir and Pt, the present claim recites a range of "up to 10 wt%" which includes zero addition of the element. Erickson teaches (see table 4) that the process includes a step of solutionizing wherein up to 100% of the  $\gamma'$  (i.e.-all the  $\gamma'$ ) is taken into solution. Thus, the superalloy of Erickson is free from eutectic  $\gamma - \gamma'$ . The composition taught by Erickson does not contain any other elements, and hence, meets Applicant's "consisting of" language.

Erickson teaches (see col 11, line 63 to col 12, line 21) that the alloy is treated to produce primary gamma prime particles and also secondary gamma prime particles with an ultra-fine size. Thus, Erickson teaches an alloy with a gamma prime morphology with a bimodal  $\gamma'$  distribution.

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Though Erickson teaches (see col 37, lines 55-58) that the alloy is subjected to HIP (hot isostatic pressing) in order to facilitate "nearly complete pore closure" Erickson does not teach a step of HIPing that is at a pressure similar to that of the present invention. The "nearly complete pore closure" of Erickson does not mean pore-free.

Kenton teaches (see abstract) a method of removing cast defects, such as micropores, in superalloys by subjecting the alloy to an HIP treatment. Kenton teaches (see col 5, lines 58-68) that the HIP treatment occurs at 1800-2350°F at 5-50 ksi. This treatment improves the mechanical properties of the alloy, including (see col 5, line 68 to col 6, line 17) the substantially complete removal of defects such as micropores.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the HIP treatment of Kenton to the alloy of Erickson because the HIP treatment of Kenton improves the mechanical properties of the alloy by removing casting defects such as pores (see abstract and col 5, line 68 to col 6, line 17). Thus, the alloy of Erickson in view of Kenton is pore-free.

Erickson in view of Kenton do not teach the sizes and volume percent distribution of the  $\gamma'$  precipitates as claimed. However, given the teaching of Erickson (see col 11, line 66 to col 12, line 21), it would have been within the expected skill of a routineer in the art to adjust the  $\gamma'$  aging condition in order to obtain a desirable  $\gamma'$  particle size such as that disclosed by DeLuca et al.

DeLuca et al teach (see abstract) forming a bimodal  $\gamma'$  precipitate distribution in a superalloy. The large particles had (see col. 3, lines 29-45) size of about 5-15 microns

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and were preferably present (see claim 6) at about 30-40% by volume. The small cuboidal particles have size of about 0.3-0.7 microns.

Therefore, it would have been obvious to one of ordinary skill in the art to incorporate the bimodal  $\gamma'$  precipitate distribution of DeLuca et al in the alloy of Erickson because the bimodal  $\gamma'$  distribution provides (see abstract) a microstructure that was damage tolerant, thus leading to a longer workpiece lifetime.

Regarding claims 4 and 11, DeLuca et al teach (see col. 3, lines 33-34) that the smaller  $\gamma'$  precipitates are cuboidal in shape. DeLuca et al teach (see col. 3, lines 44-45) that the large  $\gamma'$  precipitates have a branched configuration with three or four branches. The four-branched precipitates are “octet-shaped” precipitates as claimed.

Regarding claim 5, Erickson teaches (see title) that the superalloy is a single crystal.

Regarding claims 6, 10 and 24, Erickson teaches (see col 11, line 63 to col 12, line 21) that the alloy is treated to produce primary gamma prime particles and also secondary gamma prime particles with an ultra-fine size. Thus, Erickson teaches an alloy with a gamma prime morphology with a bimodal  $\gamma'$  distribution. Combined with the teachings of DeLuca et al (specifically in the abstract and col. 3, lines 46-50) of restraining crack propagation, one of ordinary skill in the art would have expected the alloy of Erickson in view of Kenton and DeLuca et al to have the ability to resist initiation and subsequent propagation of fatigue cracks in a hydrogen environment as claimed.

Regarding claims 7-9, Erickson in view of Kenton do not teach the sizes and volume percent distribution of the  $\gamma'$  precipitates as claimed. However, given the

teaching of Erickson (see col 11, line 66 to col 12, line 21), it would have been within the expected skill of a routineer in the art to adjust the  $\gamma'$  aging condition in order to obtain a desirable  $\gamma'$  particle size such as that disclosed by DeLuca et al.

Regarding claim 25, see above regarding claims 4 and 24.

Regarding claim 26, see above regarding claims 1 and 24.

Regarding claims 27 and 28, the nickel base superalloy of Erickson in view of Kenton and DeLuca et al contained the claimed composition, was pore free and was eutectic  $\gamma-\gamma'$  free. The four-branched precipitates read on the "octet-shaped" precipitates, which Applicant disclosed (see page 5) as being the means for impeding preferential cracking in the  $\gamma$  matrix phase. Therefore, the prior art meets the limitations of this claim.

#### ***Response to Arguments***

5. Applicant's arguments filed 19 December 2005 have been fully considered but they are not persuasive. Applicant argued that:

a. Erickson fails to teach the claimed range of Re.

In response, Erickson teaches a range of Re of about 5.0 to 7.0 wt%. "About" means that the values of Re were within the two end points, or reasonably close to the endpoints. Therefore, the disclosure of Erickson includes values of Re below 5.0 wt% that would have been considered "about 5.0 wt%", such as 4.9 wt%. Assuming, *arguendo*, that "about" cannot be read in the manner put forth by the Examiner, Erickson would still create a *prima facie* case of obviousness because the range of the

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prior art (5.0 to 7.0 wt%) was close enough to the presently claimed range (less than 5.0 wt%) as to be considered by one of ordinary skill in the art to have the same properties.

If the range of prior art and claimed range do not overlap, obviousness may still exist if the ranges are close enough that one would not expect a difference in properties. *In re Woodruff* 16 USPQ 2d 1934; *Titanium Metals Corp. v. Banner* 227 USPQ 773 (Fed. Cir. 1985); *In re Aller* 105 USPQ 233 and MPEP 2144.05 I.

b. Kenton's teaching of "substantially complete removal" does not read on Applicant's "complete removal".

In response, the time, temperature and pressure parameters of the process of Kenton is substantially to the parameters disclosed by Applicant in the specification. Thus, one of ordinary skill in the art would have expected the process of the prior art to produce the substantially "complete removal" result.

"Where the claimed and prior art products are identical or substantially identical in structure or composition or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established, *In re Best* 195 USPQ 430, 433 (CCPA 1977). 'When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing they are not.' *In re Spada*, 15 USPQ2d 1655, 168 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best* 195 USPQ 430, 433 (CCPA 1977)." See MPEP 2112.01

The fact that the HIP process of Kenton and the disclosed HIP process are substantially identical provides the sound technical basis for asserting that the two method steps produce the same result. It is now Applicant's burden to show that the process of Kenton does not produce the claimed result.

c. The step of Erickson to "fully solutionize the gamma prime phase" does not mean that the alloy is eutectic gamma-gamma prime phase.

In response, by fully solutionizing the gamma prime phase, Erickson removes any and all of the eutectic gamma prime phase. Thus, the resulting alloy is free from the eutectic gamma prime phase.

- d. Erickson does not teach a heat treatment to fully solutionize the eutectic gamma prime phase.

In response, the Examiner disagrees. Erickson does show heat treatments which produce 100% solutionizing. With respect to Applicant's arguments about the Cr amount having to be less than 3.0 wt%, Erickson is silent with respect to such a statement. Applicant has provided no explanation as to why the 100% solutionizing would inherently flow from having a Cr content below 3.0 wt%.

- e. DeLuca et al relate to a trimodal distribution of gamma prime precipitates.

In response, the disclosure of DeLuca et al should not be construed as being limited to any preferred embodiments, and DeLuca et al clearly also suggests the bimodal distribution.

- f. DeLuca et al do not teach "octet shaped" gamma prime precipitates.

In response, Applicant's statement that the four branched particles "could have more than eight sides or facets" is mere speculation and is not supported by facts.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Harry D Wilkins, III  
Primary Examiner  
Art Unit 1742

hdw